The reACT$_2$ant

Summer 2010

Volume 17 Issue #3

Please take time to join the new ACT2 site that Barbara Schumann's husband Paul has set up a special networking site for ACT$_2$ at http://act2network.ning.com. You need to join, but we can post presentations from CAST, biennial etc. here. This will be a scrapbook for the future. Please join this group to get updates,the newsletter, and education news from the state.

This is the last newsletter of my term. It has been very hard to find time to write it. I took on a new prep this year– IB chemistry which proved to be very time consuming. My dear friend, Roberta Young, died just 3 weeks after being diagnosed with lung cancer. She had been an inspiration to me and we had attended / presented at 20 CAST conferences together. Just last summer we attended the POGIL conference in Salt Lake. Just like Rosendo's death, Roberta is gone to soon.

If you didn't hear, the SBOE has postponed science textbook adoptions. This will be a mess because schools won't have enough books for students on the 4x4 plan. You can't buy books that are 10 years old. Plus new AP audits won't be approved with books that are older than 10 years.

After the AP test, my AP students travel to nearby school and put on science demonstration shows. This is to encourage future chemistry students. The feedback we get from students now in chemistry is that the demonstration show made them realize that chemistry is not that hard. I have always loved watching Barbara and Eva Lou perform demonstrations. It always charges my batteries up for the next school year. Both Barbara and Eva Lou have given so much to ACT2. Hats off to both of you fine ladies. I also want to thank Bob Casao for getting the word out about the state of education in Texas. Now we need some young teachers to step up and serve the organization as officers. Please volunteer.

See you at the Biennial, Meg

Inside this Issue:

Nominate a fellow teacher for the Teacher of the Year Award. This award will be given out at the Biennial Conference.

Be sure to keep your email address current with Bob Casao so the science updates and news comes to you. If your school has a spam filter, you may want to get a gmail address so news comes through.

ChemEd 2011 will be at Western Michigan in Kalamazoo on July 24-28,2011.

THE NEWSLETTER IS TRYING TO GO GREEN . If the newsletter came through, let me know. I WANT TO SEND THE NEWSLETTER VIA EMAIL. MANY SCHOOL EMAILS ARE BLOCKED SO I NEED A HOME EMAIL. PLEASE CONSIDER GETTING A GMAIL ACCOUNT SO I CAN SEND THE NEWSLETTER AS A PDF TO YOU. SEND YOUR EMAIL TO megyoun@gmail.com

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Cast presentations from 2009 are found at http://act2network.ning.com/

CAST 2010

Science in the City

CAST 2010 is being held from November 11 through 13 in Houston, Texas in the George R. Brown Convention Center.

ACT2 Members

Needed to Run For Office.

President-elect, Secretary, Treasurer

Contact: Dale Moore at dmoore03@sbcglobal.net

Help keep the organization strong. Please volunteer. Elections during the Biennial Conference 2010 in Katy.

ACT2 newsletters:

National Chemistry Week 2010:

October 17-23, 2010

Theme: "Behind the Scenes with Chemistry"

Mole Day 2010: Moles of the Caribbean

ChemEd 2011

http://www.semcto.com/chemEd2011.html

EXOTHERMIC AND ENDOTHERMIC REACTIONS

Shared by Maggie Mixon

There is an energy change involved in every reaction, whether it is a chemical or a physical change. In this lab you are going to do 2 physical reactions and graph the temperature as the reaction proceeds with time.

Exothermic reactions will feel warm, temperature will increase and ΔH will be negative. When written in an equation heat will appear as a product for exothermic reactions.
Endothermic reactions will feel cooler, temperature will decrease and ΔH will be positive. When written in an equation heat will appear as a reactant for endothermic reactions.

Purpose: To observe endothermic and exothermic dissolving plus endothermic and exothermic reactions.

Materials:

150 mL beaker	thermometer clamp	25 mL graduated cylinder
Sodium thiosulfate	calcium chloride	

Procedure:

1. Using a 25 mL graduated cylinder, measure 25 mL of water into a 150 mL beaker. Lower the temperature probe into the water so that it does NOT touch the sides or the bottom of the beaker.

2. Allow the computer to collect temperature of the water for about 20 seconds and then record the temperature of the water in your data table.

3. Add one (1) level spoonful of calcium chloride to the water and stir with the temperature probe until the calcium chloride is all dissolved. Record the **highest** temperature in the data table.

4. If the temperature decreased, record the **lowest** temperature in your data table.

5. Touch the outside of the beaker and notice if the solution feels warmer or colder.

6. Pour the contents of the beaker down the sink and wash out the beaker.

7. Repeat except use 1 level spoonful of sodium thiosulfate ($Na_2S_2O_3$). Pour the contents of the beaker down the sink.

ENDOTHERMIC & EXOTHERMIC REACTIONS

Reaction	Initial Temp.	Highest or Lowest Temp.	Change in Temp.	Heat Produced or Absorbed?
Calcium Chloride dissolving in water				
Sodium thiosulfate dissolving in water				

1. Is calcium chloride an exothermic or endothermic dissolver and how do you know?

2. Would the change in enthalpy (ΔH) in the above reaction be positive or negative?

3. If the energy in question # 2 above were written in the formula, on which side would it be placed? (Reactant side or product side)

4. Is sodium thiosulfate an exothermic or endothermic dissolver and how do you know?

5. Would the change in enthalpy (ΔH) in the above reaction be positive or negative?

6. If the energy in question # 5 above were written in the formula, on which side would it be placed? (Reactant side or product side)

7. Draw a graph in the space, below left, showing the time as the independent variable and the

energy as the dependent variable for the dissolving of the calcium chloride.

Calcium Chloride Sodium Thiosulfate

Limiting Reactant Problems

First the hamburger analogy using my recipe for a bacon double cheeseburger is:

* 1 hamburger bun
* 2 hamburger patties
* 2 slices of cheese
* 4 strips of bacon

Based on this recipe:

If I have five bacon double cheeseburgers:

1. How many hamburger buns do I have? _____

2. How many hamburger patties do I have? _____

3. How many slices of cheese do I have? _____

4. How many strips of bacon do I have? _____

How many bacon double cheeseburgers can you make if you start with:

5. 1 bun, 2 patties, 2 slices of cheese, 4 strips of bacon _____

6. 4 buns, 4 patties, 4 slices of cheese, 8 strips of bacon _____

7. 1 dozen buns, 24 patties, 24 slices of cheese, 4 dozen strips of bacon _____

8. 1 mole buns, 2 mole patties, 2 mole slices of cheese, 4 mole strips of bacon _____

9. 10 buns, 20 patties, 2 slices of cheese, 40 strips of bacon _____

10. If you had fixings for 100 bacon double cheeseburgers, but when you were cooking you ruined 10 of them. What percentage of the bacon double cheeseburgers do you actually make?

Now, the chemistry problem. Note: The math and the concepts are identical to the above example. The only difference is the recipe. Here are two examples of chemical recipes:

* $2Na + Cl_2 \rightarrow 2\ NaCl$
* 1 mole of H_2SO_4 + 2 mole NaOH produce 1 mole Na_2SO_4 + 2 mole H_2O

Based on the recipes above: Use dimensional analysis and show all work. Box in your answer.

If I have 1.00 mole of NaCl

11. How many moles of sodium do I have?

12. How many moles of Chloride do I have?

If I want to make 5.00 moles of Na_2SO_4:

13. How many moles of H_2SO_4 do I need?

14. How many moles of NaOH do I need?

Limiting Reactant Problems Continued

$H_2SO_4 + 2\ NaOH \rightarrow Na_2SO_4 + 2H_2O$

How much Na_2SO_4 can I make if I have: (Each problem requires two problems to be worked!)

15. 2.00 mole of H_2SO_4 and 4.00 mole of NaOH Name the limiting reactant_____

2.00 mole H_2SO_4 |_____ = _____ mole Na_2SO_4

4.00 mole NaOH |_____ = _____ mole Na_2SO_4

16. 10.0 mole of H_2SO_4 and 10.0 mole of NaOH Name the limiting reactant_____

17. 0.200 mole of H_2SO_4 and 0.200 mole of NaOH Name the limiting reactant_____

18. 1.00 mole of H_2SO_4 and 2.00 mole of NaOH Name the limiting reactant_____

19. 0.420 mole of H_2SO_4 and 0.650 mole of NaOH Name the limiting reactant_____

20. 5.00 grams of H_2SO_4 and 5.00 grams of NaOH. Name the limiting reactant_____

A list compiled by Todd Abronowitz
madchemist@2guysofscience.com

PROPERTIES

Extensive properties versus intensive properties

INdependent = ***In***tensive

Periodic Trends

"The further away, the more they play".

"AIME DIDI" will help you with the periodic trends as you move to the right and the exact opposite as you move down. The letters in the "first name" match with the letters in the "second name". A = atomic radii →Decreases, I = ionization energy → increase,
M = metallic character →decreases, E = electronegativity → increase

"Left hand rule": Hold your left hand and arm up and down → atomic radii follows the shape of the hand (bigger going down) for the group trend…then lay the left hand and arm flat (horizontal) and atomic radii going across a period.

GAS LAW RELATIONSHIPS

Put P T and V in alphabetical order on a three-hole punch of paper so that each letter matches up with a hole. Put a pencil through the hold of the one that remains constant and then tip the paper. The direction of the "tip" will tell you if it is a direct or inverse relationship. Either the two holes will both go up, or one will go up and the other will go down.

Have students spell "direct" and have them spell "temperature" and then ask them the first letter of the word "temperature" and the last letter of the word "direct". Anything that involves temperature is a direct relationship **(Please note:** This only works if you use the word "inverse" for pressure and volume relationship and not the word "indirect").

Have students put "Boyle" "Charles" and "Gay-Lussac" in alphabetical order. Then put the combined gas law up (you really only need the left hand side for this):

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

Have them put their finger on the first thing listed (P_1) and have them count 1 (finger on P_1), move their finger to V_1 and count two, and finally move their finger to T_1 and count three. We count to three, since there are three laws. Now that you counted to three and have your finger over T_1, you take out that letter and you have Boyle's Law (the first one on the list in alphabetical order), next move your finger to P_1 and now you have Charles's Law, and finally move your finger to V_1 and you have Gay-Lussac's Law.

PT Cruisers are gay →Gay-Lussac's Law

Charles Law = Cable TV.

Chemical misconceptions
http://www.rsc.org/education/teachers/learnnet/miscon2.htm
This site has some excellent worksheets and teacher information about common chemistry misconceptions. Amy-Lou uses several of the available worksheets and finds them nice in helping students develop their concepts.

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Slideshare:
http://www.slideshare.net/
Search this site for powerpoints and worksheet about topics in chemistry.

Creative Chemistry
http://www.creative-chemistry.org.uk/
All kinds of activities, worksheets, labs, etc that can be used in science classroom.

Nice measurement worksheet is found at
http://www.pfscience.info/legacy_site/Ch1_CPO/Measurement_Activity_POGIL.pdf.

Chemmybear
http://www.chemmybear.com/
Notes, worksheet, and ideas are found at this great site.

Bill Deese's website
http://www.deadchemistssociety.com/
Information on how to build many of the apparatus used in demonstrations.

IB Chemistry
http://www.savitapall.com/
Information on the IB program with notes, labs, worksheets

Jonathan Bergmann's ning
http://vodcasting.ning.com/
.Ideas about using vodcasting are shared. Information about moodle, workshops, etc.

Prezi
http://prezi.com/
A new way to do presentations. Check out the prezi on web 2.0 tools.

Jing
http://www.jingproject.com/
Free program that allows you to make 5 minute vodcast about concept students don't understand.

Flinn eLearning Videos: Effective immediately, Flinn Scientific has reduced the price of viewing to $5.95 for 60 days. The samples are great so check them out.

CHEMICAL EQUILIBRIUM: WEATHER PREDICTING FLOWERS

From Melissa Jones

Introduction:

Cobalt chloride changes color depending on whether it is hydrated or not. The reaction is:

$$CoCl_{2\,(blue)} + 6H_2O \text{ ¾ } CoCl_2 \cdot 6H_2O_{\,(pink)}$$

This can be used to predict weather – because it will change color depending on the humidity in the air.
The pink complex would indicate more moisture in the air and the blue compound would indicate drier air.
This property will be used to make weather predicting flowers – coffee filters soaked in cobalt chloride and then dried. The flowers will change color – pink to blue depending on the weather.

Purpose:

To see the equilibrium reaction of hydrated/anhydrous cobalt chloride
To make weather predicting 'flowers"

Safety: Wear goggles and aprons

Materials:

500 mL of 10% aqueous cobalt chloride solution
coffee filters
Sprayer bottle filled with water
pipe cleaners
hair dryer

Procedure:

1. Fold the filter paper in a small wedge shape (quarter folds – like filter paper)
2. Pleat the edges of the triangle as you would a fan.
3. Twist the pipe cleaner around the pointed end
4. Dip briefly into the $CoCl_2$ solution.
5. Dry the flowers in an upside down position.
6. When dry, fluff the paper into a shape resembling a flower.
7. Take the sprayer bottle and mist the flower.
8. Take the hair dryer and dry the flower.
9. When the air is humid, the flower to pink. When the air is dry, the flower is blue.

Data:

Flower	Color	Compound formed
Original		
After misting		
After drying		

Questions:

1. What color is the hydrated compound?
2. What color is the anhydrous compound?
3. What other uses can you think of for this compound?
4. What would happen to the reaction if you added more $CoCl_2$ (anhydrous)?
5. Adding water shifts the equilibrium in which direction?
6. Write the equilibrium expression for this reaction.

Conclusion:

Write a short paragraph identifying the purpose of this lab and assessing whether the purpose was met. Give specific examples as to whether the purpose was or was not met.
Give suggestions on how to improve this lab and what you have learned from this lab.

PERCENTAGE OF WATER IN POPCORN Lab

Try this lab when teaching hydrates or percent composition. Great to do at Thanksgiving. % should be around 14%.

Overview: The mass of a cup popcorn is determined. After the popcorn has popped, the mass is found again and the percentage of water in the popcorn is then determined.

Materials: 1/3 cup of popcorn, air popper, balance, paper bag, bowl

Procedure:

1. Find the mass of the cup & uncooked popcorn _____

2. Mass of cup _____

3. Mass of uncooked popcorn _____

COOK THE POPCORN IN THE AIR POPPER

4. Mass of the paper bag (before popcorn finishes popping) _____

5. Find the mass of the bag and popped corn _____

6. Mass of cooked popcorn alone. _____

7. Determine the mass of the water that was in popcorn _____
EAT THE POPCORN!!

8. Calculate the % water in the popcorn _____

9. A sample of a hydrocarbon has a mass of 88.0 grams. 72.0 grams of this sample is carbon and the remaining mass is hydrogen. What is % carbon?
What is % hydrogen?

10. Ivory soap claims to be 99.44% pure soap. If a bar of soap has a mass of 87 grams, how much of that is pure soap?

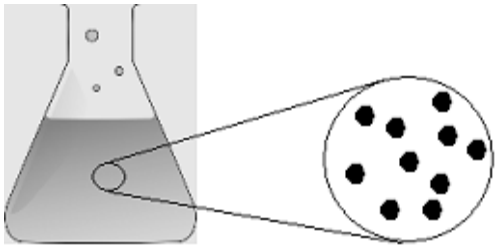
Conclusion: Compare the % by mass of water in your popcorn with two other groups. Were they the same or different?

How does popcorn go stale?

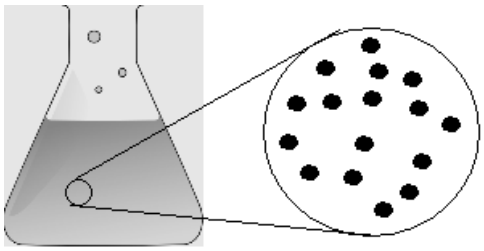
Is there a "perfect" % water that keeps duds from forming?

Conceptual Understanding of Moles

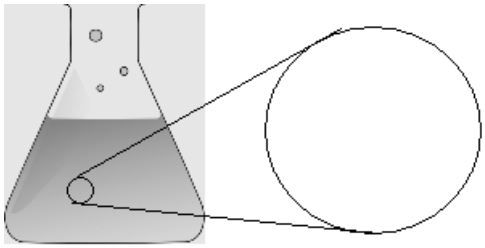
from Chem 8



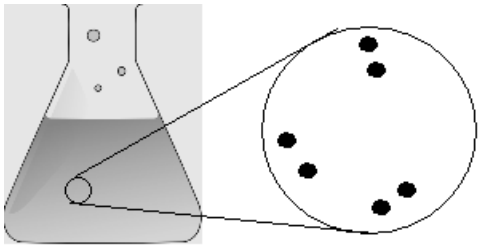
This illustration at the left shows a flask that contains 1.00 mole of argon gas. The mass of the gas in the flask is 40.0 g. Base your answers to the next four questions on this information.



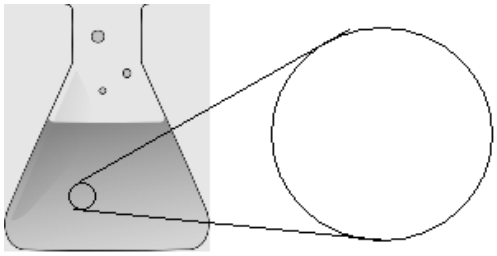
How many moles of Ar are illustrated in this flask? _____
What is the mass of the gas in this flask? _____



The bottle on the left contains 0.50 mol of argon gas. Put the appropriate number of particles in the circle.
What is the mass of the gas in this flask?



How many moles of Ar are illustrated in this flask? _____
What is the mass of the gas in this flask? _____



The bottle at the left contains 60.0 grams of argon gas. Put the appropriate number of dots in the circle.
How many moles of argon are in this flask? _____

Nuts and Bolts Stoichiometry

Introduction:
Chemical reactions occur when a certain number of reactants react with a certain number of another reactant (given as coefficients in the balanced equation). We can see this information to determine the mass of reactants needed, and the mass of the products formed if we know the average masses of the species involved. This is called stoichiometry. In this activity, you will consider the ideas of stoichiometry with nuts and bolts.

Procedure:
You have a cup with some nuts and bolts. The product that you are to make consist of two nuts on each bolt. Your goal is to make as many of the product as possible.

Lab Questions:
1. Using N to symbolize the nuts and B to symbolize the bolts, write out an equation for the formation of the product and justify your answer. Make an analogy with chemical equations and pay attention to the difference between a coefficient and a subscript.

2. How many nuts did you have? _____ How many bolts? _____

3. How many of the products could you make? _____

4. Which reactant (nut or bolt) was limiting? _____ How did you determine this? Is it the reactant you had fewer of? Explain.

5. How much of which reactant did you have left over? How did you determine this?

6. Why does there have to be something left over in this case? That is, why couldn't you just make a product with fewer or more nuts? How does this relate to balancing a chemical equation?

Given that the average mass of a bolt is 10.64g and the average mass of a nut is 4.35 g, answer the following questions:
7. What is the mass of all the bolts you were given? Mass of all nuts?

8. What is the mass of one product? What is the mass of all the products that you formed?

9. What is the mass of the left over reactant?

10. Given the mass of bolts you had, calculate the mass of the nuts you would need to use up all the bolts.

11. Given the mass of nuts you had calculate the mass of the bolts you would need to use up all of the nuts.

Friends of yours give you what they say is "about 1000 g" of nuts and "about 1000 g" of bolts. Answer the following questions:

12. How many nuts were you given? _____ How many bolts? _____

13. Which reactant is limiting? Why is one limiting if you have equal mass of each?

14. What is the mass of the product you could make? How many is this?

15. How many of which reactant is left over? What is the mass of left over reactant?

16. Given the mass of bolts you had, calculate the mass of the nuts you would need to use up all the bolts.

17. Given the mass of nuts you had, calculate the mass of bolts you would need to use up all of the nuts.

Additional Questions (Post-lab)

1. An individual coefficient in a balanced equation is meaningless. Why?

2. Consider the reaction represented by the unbalanced equation

$NH_3 + O_2 \rightarrow NO + H_2O$

For every 1 mol of NH_3 that reacts, _____ mol of O_2 is required. (Show work)

3. Consider the reaction represented by the unbalanced equation

$N_2\,(g) + H_2\,(g) \rightarrow NH_3(g)$

Determine the number of moles of NH_3 (g) that can be produced from the following:
Show work.

a. 0.20 mol N_2 (g) reacts completely with H_2(g)

b. 0.30 mol H_2(g) reacts completely with N_2(g)

4. Consider the reaction represented by the unbalanced equation

$O_2\,(g) + H_2\,(g) \rightarrow H_2O\,(g)$

Determine the number of moles of H_2O (g) that can be produced from the following:
Show work.

a. 0.20 mol O_2(g) reacts completely with H_2(g)

b. 0.30 mol H_2(g) reacts completely with O_2(g)

5. Which would produce a greater number of moles of product: a certain amount of hydrogen gas reacting with oxygen to make water, or the same amount of hydrogen gas reacting with nitrogen gas to make ammonia?

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